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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/016,067	12/06/2001	Louis C. Philippe	Serie 4429 53b-1	7458

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EXAMINER

CIRIC, LJILJANA V

ART UNIT	PAPER NUMBER
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3743

DATE MAILED: 04/22/2003

8

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.
10/016,067

Applicant(s)
Philippe et al.

Examiner
Ljiljana V. Ciric

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on Jul 10, 2002, on Nov 21, 2002, and on Feb 18, 2003.

2a) ☐ This action is FINAL.

2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) 15-33 is/are pending in the application.

4a) Of the above, claim(s) none is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) 15-33 is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9) ☒ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on Dec 6, 2001 is/are a) ☐ accepted or b) ☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☐ All b) ☐ Some* c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.

2. ☐ Certified copies of the priority documents have been received in Application No. _____.

3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

a) ☐ The translation of the foreign language provisional application has been received.

15) ☒ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

4) ☒ Interview Summary (PTO-413) Paper No(s). 8

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

5) ☐ Notice of Informal Patent Application (PTO-152)

3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____

6) ☐ Other:

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DETAILED ACTION

Response to Amendment

1. This Office action is in response to the amendments and arguments filed on July 10, 2002, on November 21, 2002, and on February 18, 2003.
2. Claims 15 through 33 remain in the application, of which claims 15 through 30 have been amended and claims 31 through 33 are new.

Response to Arguments

3. Applicant's arguments filed on July 10, 2002 fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the prior art.

Applicant's arguments also do not comply with 37 CFR 1.111(c) because they do not clearly point out the patentable novelty which he or she thinks the claims present in view of the state of the art.

The examiner, however, notes with appreciation the applicant's detailed explanations of the changes made to the claims in order to overcome the rejections under 35 U.S.C. 112, second paragraph, as cited in the previous Office action. Although a number of new indefiniteness problems have been introduced via the amendments made to the claims as noted below in the section relating to 35 U.S.C. 112, second paragraph, at least some of the original indefiniteness

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problems as identified in the previous Office action have been overcome. Please note, however, that merely removing "the" preceding an element, while almost always resulting in awkward grammatical construction, generally does not automatically result in there being proper antecedent basis for the element where there was none before. Upon reconsideration in view of the awkward resultant sentence construction and in view of proper antecedent basis not being required for the recitation of inherent elements or features, the examiner hereby withdraws some of the previously cited rejections of the claims based upon insufficient antecedent basis, as noted below in the section relating to claim objections.

Drawings

4. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the following features must be shown or the features canceled from the claims: a sensor for sensing the oxygen concentration in the flue gas as recited in claims 25 and 26; a sensor for sensing the sulfur dioxide concentration of the flue gas as recited in claims 27 through 29; sensors for sensing the average temperatures at different levels of the boiler as recited in claim 30; a sensor or other sensing means for sensing the reduction efficiency of the smelt as recited in claims 31 through 33. Note that the requirement for illustrating all of the features of the claimed invention may be most readily met without adding new matter by providing new drawings in the form of flow diagrams corresponding to each of the claimed methods. No new matter should be entered.

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A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

5. The abstract of the disclosure is objected to because it does not avoid words and phrases which can be implied, such as the phrase “are presented” as cited in line 2 of the abstract. Also, the scope of the invention as summarized by the abstract appears to fail to correlate even generally to the scope of the claimed invention. For example, the abstract refers to a method for retrofitting black liquor recovery boilers yet there appear to be no steps for doing so recited in the claims of the instant invention. Correction is required. See MPEP § 608.01(b).

Claim Objections

6. Claims 15 through 33 are objected to because of the following informalities, for example: “to” should be inserted immediately preceding “boilers” [claim 15, line 3]; “the” should be inserted immediately preceding “recovery boiler” [claim 17, line 1]; “third” [claim 19, line 3; claim 19, line 4; claim 24, line 2] should be “tertiary”; “fourth” [claim 19, line 3; claim 19, line 5; claim 20, line 2; claim 24, line 3] should be changed to “quaternary”; “to” should be inserted immediately preceding “one or more of” [claim 19, line 4]; “the” should be reinstated immediately preceding each of “oxygen” [claim 25, line 1; claim 26, line 1] and “flue gas” [claim 25, line 1; claim 26, line 1]; “to” should be inserted immediately preceding “a recovery boiler” [claim 25, lines 2-3]; a semi-colon (;) should be inserted immediately following “oxygen

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concentration” [claim 25, line 8]; the period (,) immediately following “concentration” [claim 25, line 12; claim 26, line 11] should be removed for improved readability and clarity; “upper most” [claim 26, line 9]; “the” should be reinstated immediately preceding “combustion stability” [claim 27, line 1; claim 28, line 1]; “the” should be inserted immediately preceding “flue gas” [claim 27, line 5]; “the” should be reinstated immediately preceding “temperature profile” [claim 30, line 1]; “the chemical recovery of a recovery boiler” [claim 31, line 1; claim 32, line 1] should be replaced with “chemical recovery in a recovery boiler” for improved grammatical correctness and clarity. Appropriate correction is required.

Claim Rejections - 35 U.S.C. § 112

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. Claims 31 through 33 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. Claims 31 through 33 recite a method for improving chemical recovery in a recovery boiler including the step of sensing the reduction efficiency of the smelt. The specification, however, merely mentions that a method for improving either the combustion stability or the chemical recovery may include the step of sensing the reduction efficiency of the smelt, but fails to provide any additional information beyond what is in the claim

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with regard to this sensing step. No mention is made with regard to how, where, or by what means this sensing step is to be accomplished. The drawings also fail to provide any additional information. Furthermore, sensors for directly sensing the reduction efficiency of smelt per se do not appear to be well-known in the art. Thus, there is insufficient disclosure by applicant to reasonably support applicant's claims.

9. Claims 31 through 33 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. As already noted in greater detail above, applicants claim the step of sensing the reduction efficiency of smelt as part of their inventive method for improving chemical recovery in a recovery boiler without providing any additional clarifying or descriptive information in the specification or the drawings as to how, where, and by what means this is to be accomplished. The prior art [see the *Leffler et al.* reference, also cited below in the section pertaining to 35 U.S.C. 102] discloses that the reduction efficiency in a recovery boiler is a function of several measurable variables such as the bed temperature and the sulphur dioxide concentration in the exhaust gases, but does not appear to disclose a sensor or sensing means which directly senses (as opposed to calculating) the reduction efficiency as recited in claims 31 through 33. Designing such a sensor based simply on the definition of the reduction efficiency and on the recitation of the corresponding sensing step in claims 31 through 33 would thus require undue experimentation

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and innovation on the part of one skilled in the art at the time of invention, and is thus not reasonably enabled by the instant application.

Claims 31 through 33 also recite the open-ended range of a reduction efficiency above 90%; while this open-ended range necessarily includes reduction efficiencies of 100% and higher as broadly interpreted as required, the examiner hereby notes that efficiencies closely approaching, meeting, or exceeding 100% are not possible in thermal processes. Since thermal and other performance efficiencies cannot meet or exceed 100% without violating the accepted laws of thermodynamics, the instant application thus also is not enabling for the open-ended step of adjusting the injected oxygen flow in order to obtain a reduction efficiency above 90% as recited in claims 31 through 33.

10. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11. Claims 15 through 33 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

For example, the preamble of claim 15 is still written in a generally run-on, indefinite manner, thus rendering indefinite claim 15 and claims 16 through 18 depending therefrom. First of all, the intended scope of the alternative limitation “or boilers that originally had two air injection levels that have been retrofitted with a third injection level” is not clear. Is the claimed method applicable to only one of these cited categories of boilers or to both? If the latter, the “or” should

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be replaced with “and to”. Second of all, it is not clear whether the retrofitting process itself is intended to be included within the scope of the claim or not, particularly since the first-cited limitation “boilers with at least three air injection levels” already otherwise encompasses the second-cited limitation “boilers that had two air injection levels that have been retrofitted with a third air injection level”; furthermore, double inclusion of a limitation or an element in a claim per se lends indefiniteness with regard to the intended scope of protection sought. The preamble of claim 25 is similarly deficient, rendering claim 25 indefinite.

The limitations following “wherein” in claim 16 as written are generally incomprehensible as written. It is not clear which particular method steps, if any, are encompassed by “wherein *oxygen enrichment concentration is applied to* the primary air injection level in addition to the secondary and tertiary air injection levels”?

A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by “such as” and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd.

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App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance, claim 15 recites the broad recitation “at least three air injection levels”, and the claim also recites “the three levels being primary, secondary and tertiary levels” which is the narrower statement of the range/limitation. Also, claim 19 recites the broad recitation of “at least four air injection levels”, and the claim also recites “the four levels being primary, secondary, third [sic], and fourth [sic] air injection levels” which is the narrower statement of the range/limitation. Also, claim 21 recites the broad recitation of the enrichment concentration being the same in the primary, secondary, and tertiary air injection levels, and the claim also recites “the oxygen enrichment concentration being greater than 21%” which is the narrower statement of the range/limitation. Also, claim 22 recites the broad recitation of the enrichment concentration being different in each air injection levels, and the claim also recites “the oxygen enrichment concentration being greater than 21% in each air injection level” which is the narrower statement of the range/limitation. Finally, each of claims 25, 26, and 30 recites the broad recitation of at least two air injection levels of the recovery boiler, and each of these claims also recites “the two air injection levels being different from the primary air injection level” which is the narrower statement of the range/limitation.

With regard to each of claims 23 and 24 as written, it is not clear whether the enrichment concentration range of “up to 30%” is intended to encompass an oxygen enrichment level greater than 21% but less than 30% or whether it is intended to encompass an oxygen enrichment level

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between 0% and 30%, thus rendering the intended scope of protection sought indefinite. Also with regard to these limitations in each of these two claims, it is not clear whether the oxygen enrichment concentrations add up to 30% for the recited levels in combination or whether the concentration in each level is not more than 30%.

The term "about" in each of claims 25 and 26 is a relative term which renders the claims indefinite. The term "about" is not defined by the claims, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Thus, as used to qualify the concentration at which the sensed oxygen concentration is to be maintained, this term renders the maintenance concentration indeterminate.

If the limitation "at least two air injection levels" as recited in line 4 of claim 26 refers to three or more air injection levels, then the limitation "the other air injection level" as recited in lines 11-12 of the claim lacks clear meaning, further rendering the claim indefinite.

With regard to claim 30 as written, it is not clear whether the "different levels" referred to in line 7 of the claim refer to the at least two air injection levels or to some other levels within the boiler. However, upon looking to the specification for clarification [see page 13, line 23], it is hereby recommended that "different levels of" [claim 30, line 7] be replaced with "different heights in".

There is insufficient antecedent basis for the following limitations in the claims, for example: "the primary air injection level" [claim 27, line 3; claim 31, line 3]--recommend replacing

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with --a primary air injection level--; “flue gas” [claim 27, line 5]--it is noted that it is not even clear that the cited flue gas is even generated during combustion in, or otherwise directly associated with, the recovery boiler; “the oxygen flow injected in” [claim 27, line 6; claim 30, lines 8-9; claim 31, line 6]--recommend replacing with “the oxygen flow supplied to” or similar, as appropriate; “the flue gas” [claim 28, line 3]; “the oxygen flow” [claim 28, line 4]; “the secondary air injection level” [claim 28, line 4; claim 32, line 4]; “the sulfur dioxide emissions” [claim 28, line 5]; “the oxygen enrichment concentration” [claim 29, lines 1-2]--note that there would be sufficient antecedent basis for reciting “the oxygen concentration” since an oxygen concentration, whether it be 0% or 100%, may be considered inherent; “the measured temperature profile” [claim 30, lines 9-10]; “the boiler set point temperature profile” [claim 30, lines 10-11]--note that this may be corrected by inserting “for the boiler” immediately following “profile” in line 6 of the claim; “the smelt” [claim 31, line 5; claim 32, line 3]; and, “the oxygen flow injected in the secondary air injection level” [claim 32, line 4].

Claims 25 through 33 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: a step of generating flue gases by burning black liquor in a combustion zone of the recovery boiler [claims 25 through 28]; a step of burning black liquor in a combustion zone of the recovery boiler [claim 30]; and, a step of generating a smelt by burning black liquor in a combustion zone of the recovery boiler [claims 31 and 32].

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The above is an indicative, but not necessarily an exhaustive, list of 35 U.S.C. 112, second paragraph, problems. Applicant is therefore advised to carefully review all of the claims for additional problems. Correction is required of all of the 35 U.S.C. 112, second paragraph problems, whether or not these were particularly pointed out above.

Claim Rejections - 35 U.S.C. § 102

12. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

NOTE: The above reflects changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002.

13. As best can be understood in view of the indefiniteness of the claims, claims 15 through 18 are rejected under 35 U.S.C. 102(e) as being anticipated by *Olausson et al.*

Olausson et al. discloses a method for increasing the throughput of a recovery boiler by improving the reaction conditions within the boiler [see column 2, lines 2-4], the method

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comprising the step of injecting air (which inherently includes oxygen) at least at the secondary level 8 and the tertiary air level 10. See Figure 1.

The reference thus reads on the claims.

14. Alternately for claims 15 through 18 and as best can be understood in view of the indefiniteness of the claims, claims 15 through 24 are rejected under 35 U.S.C. 102(e) as being anticipated by *Uppstu*.

Uppstu discloses a method for increasing the throughput of a recovery boiler by intensifying the combustion process within the boiler [see column 1, lines 13-15], the method comprising the step of injecting an oxygen-containing gas (such as air) in somewhat more than stoichiometric amounts [see column 1, lines 30-34] at a plurality of levels corresponding to jet inlets 4 and 5 as shown in Figures 8 and 9. Jet inlet row 4L in Figure 9 corresponds to a primary air injection level, jet inlet row 4U corresponds to a secondary air injection level, and the various injection inlets 5 may each be considered as corresponding to a further air injection level as broadly interpreted as required.

The reference thus reads on the claims.

15. As best can be understood in view of the indefiniteness of the claims, claims 27 through 29 are rejected under 35 U.S.C. 102(b) as being anticipated by *Leffler et al.*

Leffler et al. discloses a method for improving combustion stability and efficiency, the method comprising the steps of supplying air flows (which inherently include oxygen) to the various air injection levels, including the primary air injection level 20 and the secondary air

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injection level 24, sensing the sulfur dioxide concentration in the flue gas or exhaust 32 via sensor 34, and adjusting the air (and oxygen) flow to the respective air injection levels 20 and 24 in order to minimize the sulfur dioxide emissions. See Figure 1 as well as claims 1 through 7 of *Leffler et al.*

The reference thus reads on the claims.

Allowable Subject Matter

16. Claims 25, 26, and 30 would be allowable if rewritten or amended [without significant broadening] to overcome the rejections under 35 U.S.C. 112, second paragraph, set forth in this Office action.

17. The non-application of art against claims 31 through 33 should not be construed as an indication that the claims contain allowable subject matter but rather that the claims could not be examined on the merits due to indefiniteness and enablement problems, as noted in greater detail above.

Conclusion

18. The following additional prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

While not constituting prior art per se, *Sandquist et al.* (each of three references, having an earliest foreign priority date of October 15, 1997) discloses a method for operating a black liquor recovery boiler including oxygen being supplied (both as part of the combustion air and as

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oxygen-enriched air) at various combustion air injection levels, including at levels including and above the secondary air levels, as in the instant invention.

Egan et al., *Carter et al.*, and *Kychakoff et al.* each teaches using optical monitoring as part of a furnace or boiler control system. *Rastogi et al.*, *Nelson et al.*, and *Keyes, IV et al.* each discloses a combustion control system including gas sensors for monitoring specific gas concentrations in the flue gases of furnaces and boilers.

Khinkis et al. discloses a waste material thermal treatment combustion chamber into which fuel plus an oxidant are injected at three levels.

Nilsson specifies that at lower temperatures, more sulfides are emitted in recovery boilers, whereas at higher temperatures and at higher oxygen concentrations, fewer sulfides are emitted.

Fornetti et al., *Lindman*, and *Hino et al.* each disclose state-of-the-art methods of operating black liquor recovery boilers with plural combustion air injection levels.

The paper by Elmo Nasato, entitled "*COPE™ Ejector--Proven Technology*", discusses benefits of oxygen enrichment in Claus Sulfur Recovery Units.

The article in Recovery and Power BOILER NEWS, entitled "*Need More Black Liquor Throughput? Is Your Recovery Boiler Limiting Your Operations?*", relates to the instant invention and those of the parent applications, now patented.

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ljiljana (Lil) V. Ciric, whose telephone number is (703) 308-3925. While she works a flexible schedule that varies from day to day and from week to week, Examiner Ciric

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may generally be reached at the Office during the work week between the hours of 10 a.m. and 6 p.m. ET.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Henry Bennett, can be reached on (703) 308-0101. The fax phone number is (703) 305-3463.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0861.

lvc

April 19, 2003



LJILJANA V. CIRIC
PRIMARY EXAMINER
ART UNIT 3743